[CLAIM]

What is claimed is,

[Claim 1] A production method of a high purity silica glass crucible, wherein a purity of the melted silica glass layer is increased by applying a voltage between a mold and an arc electrode to move impurity metals being contained in the melted silica glass layer to the peripheral side, when the silica glass crucible is produced by arc plasma heating a raw material powder of the silica in an inside of a hollow rotary mold, the method comprising;

carrying out an arc melting until a thickness of the formed glass layer becoming more than 5 mm and a thickness of the un-melted silica powder layer becoming less than 2 mm,

keeping an arc electrode potential within ±500 V during the arc melting, and

applying the voltage from –1000 V to –20000 V to the mold being insulated to the ground.

[Claim 2] The production method according to Claim 1,

wherein a resistance of the un-melted silica powder layer and the formed glass layer is less than 50000Ω.

[Claim 3] The production method according to Claim 1,

wherein the quantity of electricity flowing during said voltage applying is more than 13 C / m^2.

[Claim 4] The production method according to Claim 1, the method comprising;

applying the voltage to the melted silica glass while heating the silica

glass crucible at more than 1900 degree C, to decrease the impurity in the depth of less than 1 mm from the inside surface of the crucible.

[Claim 5] The production method according to Claim 1,

wherein the time for applying said voltage is less than 70% to the whole time for the arc melting, and said applying time zone is between the middle stage and the final stage of the arc melting.

[Claim 6] The production method according to Claim 1, the method comprising;

isolating between the arc electrode and the mold by

covering substantially an upper end of the mold facing to the arc electrode with the silica glass, or

installing a silica ring having a height of more than 50 mm from the upper end of the mold along with an inner circumference of the mold.

[Claim 7] The production method according to Claim 1, the method comprising;

the natural silica powder, in which the concentration of Na, K, Li, and Fe being contained as impurities is more than 0.1ppm, is accumulated on the inside surface of the mold, and the high purity synthetic silica powder is accumulated onto the natural silica powder.

[Claim 8] A silica glass crucible for pulling a silicon single crystal being produced by Claim 1,

wherein at least each content of Na and Li being contained in the depth of 1 mm from the inside surface is less than 0.05 ppm respectively.

[Claim 9] The silica glass crucible according to Claim 1,

wherein each content of Na, Li, K, and Fe being contained in the depth of 1

mm from the inside surface is less than 0.05 ppm respectively, and Cu being contained in said depth is less than 0.01 ppm.

[Claim 10] A silica glass crucible for pulling a silicon single crystal being produced by Claim 7,

wherein a natural silica powder is used in the outside of crucible, a high purity synthetic silica powder is used in the inside of crucible, and at least each content of Na and Li being contained in the depth of 1 mm from the inside surface is less than 0.05 ppm respectively.

[Claim 11] A pulling method of a single silicon crystal,
wherein the silica glass crucible according to Claim 1 is used when the single silicon crystal is pulled.

[Claim 12] A silicon single crystal pulled by the method according to Claim 11.

[Claim 13] The production method according to Claim 1, the method comprising;

the high purity silica powder layer is accumulated on the inside surface of the mold, and, as heating said layer by arc plasma, the high purity synthetic silica powder is fed and its melt is deposited onto said layer.

[Claim 14] The production method according to Claim 13,
wherein a resistance of the un-melted silica powder layer and the formed glass layer is less than 50000Ω.

[Claim 15] The production method according to Claim 13,
wherein the quantity of electricity flowing during said voltage applying is more than 13 C / m^2.

[Claim 16] The production method according to Claim 13, the method

comprising;

applying the voltage to the melted silica glass while heating the silica glass crucible at more than 1900 degree C, to decrease the impurity in the depth of less than 1 mm from the inside surface of the crucible.

[Claim 17] The production method according to Claim 13,

wherein the time for applying said voltage is less than 70% to the whole time for the arc melting, and said applying time zone is between the middle stage and the final stage of the arc melting.

[Claim 18] The production method according to Claim 13, the method comprising;

isolating between the arc electrode and the mold by

covering substantially an upper end of the mold facing to the arc electrode with the silica glass, or

installing a silica ring having a height of more than 50 mm from the upper end of the mold along with an inner circumference of the mold.

[Claim 19] The silica glass crucible according to Claim 13,

wherein each content of Na, Li, K, and Fe being contained in the depth of 1 mm from the inside surface is less than 0.05 ppm respectively, and Cu being contained in said depth is less than 0.01 ppm.

[Claim 20] A silica glass crucible for pulling a silicon single crystal being produced by Claim 13,

wherein a natural silica powder is used in the outside of crucible, a high purity synthetic silica powder is used in the inside of crucible, and at least each content of Na and Li being contained in the depth of 1 mm from the inside surface is less than 0.05 ppm respectively.